ENGINEERS AUSTRALIA

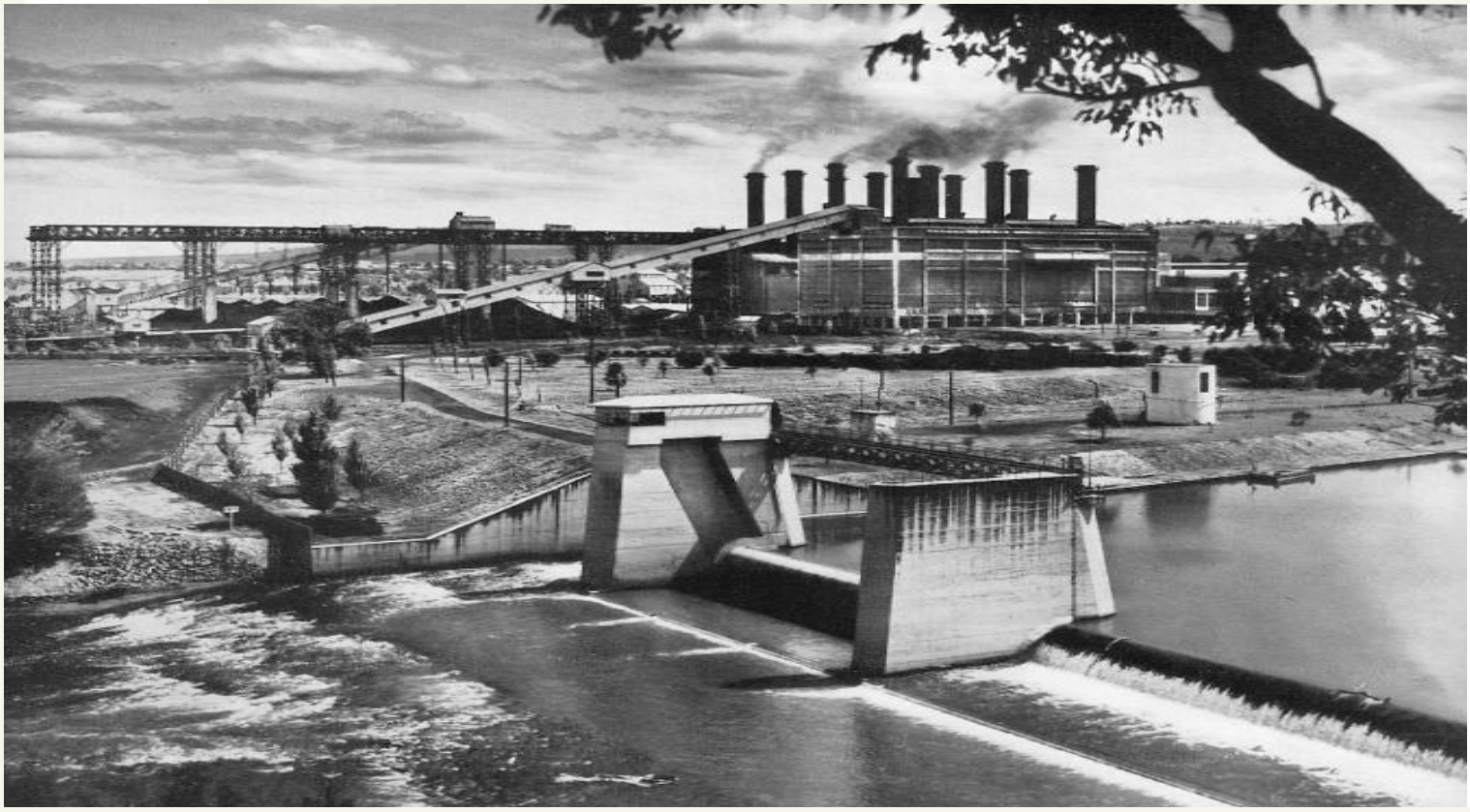
ENGINEERING HERITAGE VICTORIA

HERITAGE RECOGNITION PROGRAM

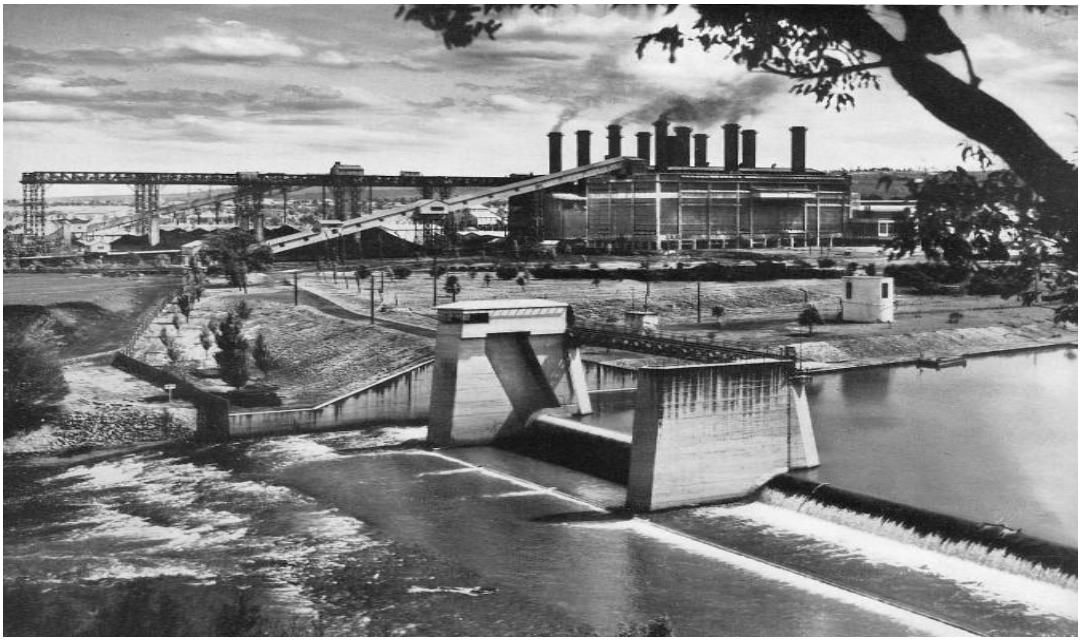
ENGINEERS AUSTRALIA

Nomination Document for the

YALLOURN POWER STATION



MARCH 2011



Caption for cover photograph

The former former power station at Yallourn, Victoria, Australia. Taken in 1948 or thereabouts

Scanned from SECV, 1949, *Three Decades: The story of the State Electricity Commission of* Victoria from its inception to December 1948*. Hutchinson & Co.*

Contents

1

1 Heritage Award Nomination Form

The Administrator
Engineering Heritage Australia
Engineers Australia
Engineering House
11 National Circuit.
BARTON ACT 2600

Name of work: Yallourn Power Station

The above-mentioned work is nominated for an award under the Heritage Recognition Program.

Location, including address and map grid reference if a fixed work: **The Yallourn power Station was situated on the south bank of the Latrobe River, approximately 160 km east of Melbourne.**

Longitude and Latitude from Google Maps:

38°10'42"S 146°20'21"E

Owner (name & address): **The former Yallourn Power Station site is now owned by TruEnergy who own and operate the adjoining Yallourn W power station.**

TruEnergy have declined to have a publicly accessible E H Marker and associated interpretive panel at the former YPS site. Instead, it is intended to place the engineering heritage recognition marker alongside the existing Yallourn Power Station interpretation at PowerWorks premises in nearby Morwell. (TruEnergy is a part owner of PowerWorks along with other electricity generating companies in the Latrobe Valley). PowerWorks address is Ridge Road, Morwell, Victoria 3246.

A letter from PowerWorks agreeing to the above proposed marking is attached at Appendix 3.

Access to site: **Access to the former Yallourn Power Station site is from the C471 exit off Princess Freeway (M1) at Hernes Oak. Site access is restricted as it is within the operational security area of TruEnergy's Yallourn W Power Station, now generally referred to as Yallourn Power Station.**

Access to PowerWorks visitors centre is off the Morwell-Loy Yang Road, C475 exit off Princes Freeway (M1) at Morwell.

Nominating Body: **Engineering Heritage Victoria**

Nomination prepared by Udara Almeida as a Victoria University engineering student work experience program, with overview and mentoring by EHV Committee members Owen Peake and Miles Pierce.

Miles Pierce
Chair
Engineering Heritage Victoria
Date: 11 July 2011

2 Introduction

Yallourn Power station has been demolished; however other assets in Latrobe Valley are not under immediate threat.

Electricity generation in the Latrobe Valley commenced at Yallourn in the early 1920's. The Yallourn power station was developed in several stages and was decommissioned in 1989. The station was subsequently demolished and the site has been cleared. Later power stations were built at Morwell, Hazelwood, Yallourn West ('W') and Loy Yang. All of these are still in operation.

These power stations have supplied most of the electricity used in Victoria since the early days of the scheme. These stations use fairly conventional steam cycles although their boilers are of special design to cope with the low calorific value and high water content of the brown coal mined. The coal is in very large deposits, close to the surface and in very deep seams so that the cost of mining and delivery to the power station is very low.

The history of Yallourn Power Station is well documented in the book "Yallourn Power Station – A History 1919 to 1989" by Colin Harvey, SECV 1993.

3 Heritage Assessment

Assessment of the eligibility of the engineering work for a Heritage Award should address the following headings.

3.1 Basic Data

3.1.1 Item Name

Yallourn Power Station (YPS)

3.1.2 Other/Former Names

N/A

3.1.3 Location (grid reference)

38°10'42''S 146°20'21''E

The Yallourn Power Station was situated on the south bank of the Latrobe River, approximately 160kms east of Melbourne.

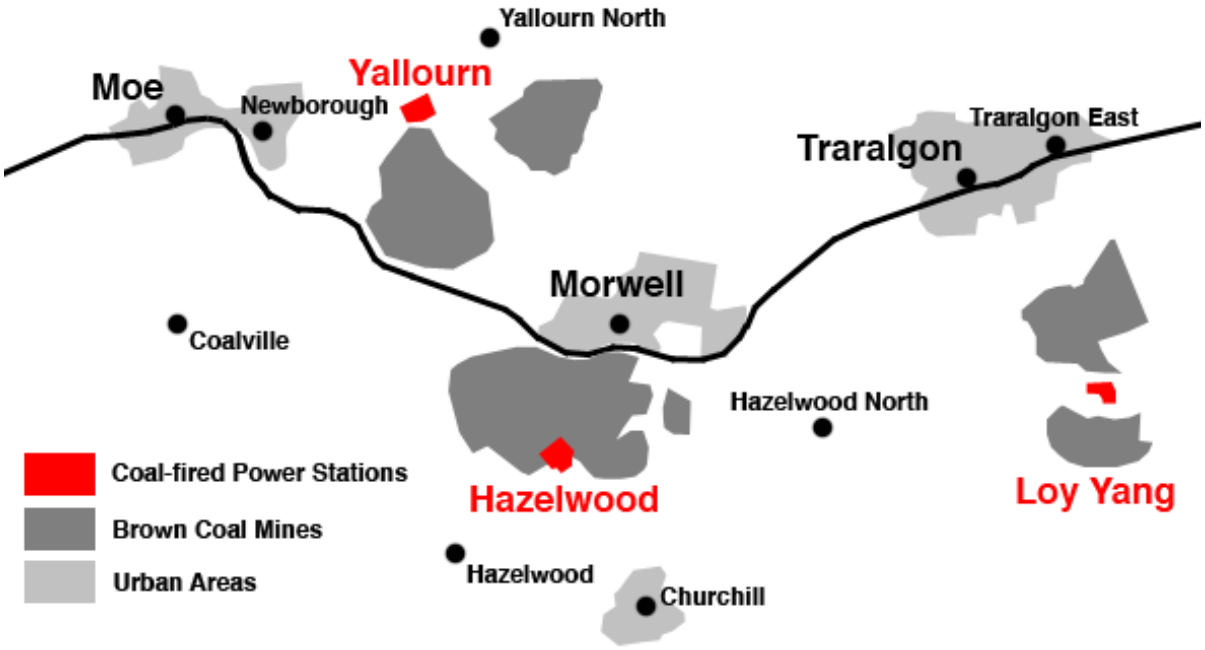


Fig.1 Map of Latrobe Valley mines and power stations

3.1.4 Address

Yallourn Drive Yallourn, Victoria, Australia

3.1.5 Suburb/Nearest Town

Yallourn North

3.1.6 State

Victoria

3.1.7 Local Govt. Area

Latrobe City Council

3.1.8 Owner

Former owner of the Yallourn Power Station was State Electricity Commission of Victoria.

The current owner of the bulk of the site is TruEnergy who also own and operate the adjoining Yallourn W Power Station; now being referred to as Yallourn Power Station.

The engineering heritage recognition is being carried out at the premises of PowerWorks, Ridge Road, Morwell, Victoria 3246. PowerWorks is owned jointly by the power generation companies in the Latrobe Valley, including TruEnergy.

3.1.9 Current Use

Yallourn Power station has been demolished; however Yallourn W located nearby (1970s onwards) operates under TruEnergy.

3.1.10 Former Use

Yallourn Power Station, in its 65 year history, overcame many challenges and made an enormous contribution in enabling Victoria to prosper and develop. The station was the major supplier of electricity to Victoria from 1924 until other Latrobe Valley Power Stations took their place and was part of the day to day lives of Victorian people and a mainstay of Victorian industry. Refer **Appendix 1.**

Table .1 Stages of Yallourn Power Station

Station	Opened	Closed	Max. Capacity
Yallourn A	1924	1968	75 MW
Yallourn B	1932	1969	100 MW
Yallourn C	1954	1984	100 MW
Yallourn D	1957	1985	100 MW
Yallourn E	1961	1989	240 MW

Note: The designations 'A' to 'E' denote the successive stages of construction of the Yallourn Power Station

3.1.11 Designer

Following the passing of the Electricity Commissioners Act of 1919, three men - George Swinburne, Archibald McKinstry, and Thomas Rankin Lyle (Chairman) were appointed as the inaugural Commissioners. These Commissioners approached Sir John Monash, Commander of the Australian Imperial Forces in Europe and professional engineer, for assistance with gathering information about mining and utilisation of brown coal.

Sir John Monash sent men to Germany to collect information since the Germans were experts on Brown coal industry. This information facilitated the planning of a rudimentary mining scheme in late 1920. The early stages of mining commenced at Yallourn soon thereafter. In 1921 the State Electricity Commission of Victoria (SECV) was established with Sir John Monash as its first Chairman. The Commission recruited a large number of labourers and engineers for the construction of the Power Station. There were a number of contractors engaged in supplying machinery and servicing the power station. See Table 2, 3 and 4.

3.1.12 Maker/Builder

Table .2 Suppliers of boilers and generators

Station	Boiler	Turbo-alternator
Yallourn A	John Thompson Water Tube Boilers Ltd of Wolverhampton, England	Metropolitan-Vickers Electrical Co Ltd of England
Yallourn B	John Thompson Water Tube Boilers Ltd of Wolverhampton, England	Metropolitan-Vickers Electrical Co Ltd of England
Yallourn C	John Thompson Water Tube Boilers Ltd of Wolverhampton, England	Parsons & Co
Yallourn D	John Thompson Water Tube Boilers Ltd of Wolverhampton, England	Parsons & Co
Yallourn E	Babcock & Wilcox of Australia Pty Ltd	Associated Electrical Industries Ltd

3.1.13 Year Started

1921

3.1.14 Year Completed

1961

3.1.15 Physical Description

The Yallourn Power Station, the first stage of which was constructed in 1921, was situated on 18 hectare site in the Latrobe Valley and it was extended from time to time by adding more generator as the demand for the electricity grew. By 1961 there were five stations (successive stages) denoted as Yallourn A, B, C, D & E respectively. Table 3 lists the salient features of the turbogenerator sets for each of the successive stages. Refer to the ***Appendix 2*** *[FIG 19]* for a station plan of the Yallourn Power Station.

Table .3 Turbogenerator Sets

TURBINE HOUSE	'A' Station	"B' Station	'C & D' Stations	'E' Station
No of TG's	6	4	2 each	2
Type of turbine	Metropolitan Vickers Impulse	Metropolitan Vickers Impulse	Parson's Impulse Reaction	Associated Electrical Industries Impulse
Capacity of generator	12,500 kW	25,000 kW	50,000 kW	120,000 kW
Generator cooling medium	Air	Air	Air	Hydrogen
Speed of turbine	3000 rpm	3000 rpm	3000 rpm	3000 rpm
No of cylinders	1	2	3	2
Stop valve steam Temperature	630°F	670°F	825°F	1050°F

Fuel:

Raw brown coal from adjacent open cut mine (65-67% moisture content)

Coal handling plant:

Coal was initially delivered from the open cut mine by rail trucks on a rope-haulage system. In later years this was superseded by conveyor belts running from the mine to the power station slot bunkers thence via crushers and conveyor belt system incorporating automatic weighbridges, to the boiler bunkers.

Boilers and Firing:

A critical aspect of the boiler design was the incorporation of some facility for the pre-drying of the raw brown coal to reduce its moisture content to achieve for stable combustion. Typically this entailed using some heat from the boiler furnace and/or hot flue gases to partially dry the coal prior to its introduction to the furnace proper. SECV engineers and boiler manufacturers progressively improved upon earlier designs to successfully fire the wet brown coal in successively larger boilers. Pulverised coal firing based on fan mills was first used for the 'C' station boilers and became the norm for all subsequent Latrobe Valley power stations.

Table .4 Boiler Plant

BOILER HOUSES	'A' Station	"B' Station	'C & D' Stations	'E' Station
No of boilers	12	10	6,6	2
Type of boilers	Thompson Water Tube	Thompson Water Tube	Thompson Water Tube	Babcock & Wilcox Water Tube –
Furnace Walls	Fire brick	Fire brick	Water cooled	Water cooled
Capacity of boilers (lb/hr)	60-90,000	80-120,000	200,000	950,000
Energy capacity	5-8 MWe	7-11 MWe	20 MWe	120 MWe
Steam pressure lb/sq. inch	260	260	645	1600
Steam temp	650°F	750°F	840°F	1060°F
Steam superheat	240°F	340°F	345°F	450°F
Feed water pressure lb/sq.inch	340	340	900	1965
Feed water temperature	200°F	280°F	350°F	420°F
Coal consumption per boiler	19-27	21	45	215

Refer to the ***Appendix 2*** *[FIG 17 and 18]* for sectional views of the boiler house and the turbine room of the 'A' Station.

Condensate and Feedwater Systems:

'A' Station:-

Condensate passed through the feedwater heating system to open condensate storage tanks, thence via deaerators to steam turbine driven boiler feed pumps.

'B' Station:-

Condensate passed through the heating system to a feed pump suction bus (header), on which steam sealed storage tanks act as surge tanks. Steam turbine driven feed pumps delivered feed water to boilers via further (high pressure) feedwater heating systems.

'C' & 'D' Stations:-

Condensate passed through LP heating system to deaerator. Deaerator extraction pumps then fed condensate to the boiler feedwater pump suction bus. The boiler feed pumps delivered water to boilers via HP heating system. The boiler feed pumps were electrically driven; emergency boiler feed pumps steam-turbine driven.

'E' Station:-

Condensate passed in turn through LP heaters, deaerator, LP feed pump, HP heaters and HP feed pump to the boiler. The feed pumps were tandem design incorporating a central electric motor with the LP pump at one end and the HP pump at the other.

Power Station Electrical Systems:

The steam turbine driven alternators for the A, B, C, and D stations were all 11 kV units and connected to 11/132 kV step-up transformers in the adjoining switchyard from whence 132 kV transmission lines conveyed the electricity output to Melbourne. The alternators of the two unit 'E' station were 13.5 kV with individual generator transformers stepping-up to connect into the 220 kV transmission network that had by then been implemented. The Station Electrical Systems for the successive stages of Yallourn Power Station are summarised by voltage level in Table 5 below.

Table .5 Voltage levels

'A' Station	**400 V**
'B' Station	**2.2 kV and 400 V**
'C' & 'D' Stations	**3.3 kV and 400 V**
'E' Station	**6.6 kV and 400 V**

(Source: **Yallourn power station, A history 1919 to 1989,** *C Harvey, p196-p198***)**

3.1.16 Modifications and Dates

Table .6 Modifications and dates

DATE	MODIFICATION
1926	No 2 Boiler fitted with a step grate pre-drier additional to the chain grate.
1927	No 6 Boiler fitted with Seyboth mechanical grate, Coal pre drying shaft and a tubular air heater of SECV design.
1928	No 10 Boiler output improved by 25% when fitted with a Howden-Ljungström air heater.
1929	No 6 Boiler fitted only with mechanical step grates, small drying shaft and rotary air heater. Nine of the boilers fitted with supplementary step grates additional to the chain or travelling grates.
1930	Problems with No 6 Boiler. Boiler tube failure and a drum cracking detected. Extensive cracking found in the tube plate areas of some drums of every 'A' boiler.
1933	All twelve 'A' boilers were reconstructed with new drums.
1936	Extra protection built for screen pits and screen house against flood-borne debris.
1941	Air raid protection constructed at the power station. Timber and earth revetments, and brick and concrete barriers were erected. 11th Australian Heavy Anti-aircraft Battery formed for the protection of the power station. Reinforced concrete protection over Turbo generators. Overhead protection and some lateral protection was provided for boilers.
1944	Boilers 5, 8, and 9 fitted with auxiliary pulverised briquette mills. No's 1-5 Alternators stator windings re-insulated. Rotor end bells on alternators 1, 3, 4, 5 and 6 removed and amortisseur (damper windings) end connections repaired. A plough was installed on No 6 Conveyor belt to allow diversion of coal to the 'B' station system.
1948	Ventilation problems in 'A' boiler house caused work bans, which were lifted when work started on the fitting of extra fans and ductwork. Outlet cooling water conduit branch installed to allow connection to planned cooling towers.

1955	Ventilation in 'A' boiler house was improved by enclosing No's 3, 4, 5, 8, 9 and 10 boiler grate fronts and fitting larger motors to ventilation fans of No's 5, 8 and 9 boilers.
1957	'E' Station orders placed for two 120 MW sets of unit plant (one only boiler and one turbo generator per unit). This was the first unit plant bought by SECV.
1963	A "Pressure Reducing Desuperheating Unit" installed and positioned on a "tee off" from the "C-D" cross over line in parallel with C3 TG, allowed more excess 'C' and 'D' station steam to be used in the 'B' turbines than could be passed through C3 back pressure turbine. Some separation firing achieved with splitter plates fitted on 'E' Boiler exhauster discharges.
1966	E1 boiler fitted with fuel separation equipment and "sandwich" burners designed by International Combustion Australia Ltd, following a trial on the south east burner on E2.
1971	Corrosion of Desuperheater tubes and tube plates and boiler tubes continued to cause failures of "C-D" boilers.
1975	Environmental protection Authority discharge licence conditions necessitated the Station being on a closed cooling water cycle for most of the year. Conduits and valves were added for this.

3.1.17 Historical Notes

During the early twentieth century, the state of Victoria was striving to establish itself as the industrial and the manufacturing heart of the country. By the end of the second decade, electricity supply capacity needed to be substantially increased and there was a strong incentive to find ways to utilise the abundant brown coal resources in the Latrobe Valley to reduce reliance on importing of black coal. Most electricity until then was generated using black coal imported from New South Wales that was all too often affected by industrial disputes leading to shortages of fuel supply.

In 1918 '*The Electricity Commissioners Act 1918'* was passed in state parliament, providing for the appointment of three Electricity Commissioners with powers covering:

(1) Control of the generation, supply and use of electrical energy throughout the state;
(2) The investigation of possible sources of power;
(3) The development of any such sources of power.

During 1919 the commissioners examined carefully the question of providing an adequate power supply for the state and reported that the most favourable scheme for immediate construction was that

involving the erection of a power station on the brown coal field near Morwell and brown coal was already been mined there, but not in any large amount.

In 1919 a report on utilizing brown coal for electricity production was presented and accepted by the parliament. Importantly the scheme was financed through the Electricity Supply Loan Act of 1919.

More than 3000 acres of land was acquired for the Morwell scheme (Later to be known as Yallourn scheme) and this area was known from two aboriginal names, brown_(yalleen), fire_(lourn).

The new energy industry was to drastically change Victoria and establish the basis for the state's industrial and business growth. On 1st October 1920, Sir John Monash was appointed as the General Manager of the scheme and he was also made permanent chairman of the State Electricity Commission of Victoria from 1st January 1921. ***See section 3.2.2.***

In early 1920's, electrical goods were still a novelty for most people in Victoria and brown coal had been used only on a small scale to generate electricity.

The timber and scrub, which covered the area above the thick coal seam, had to be cleared firstly to construct the proposed power plant and mine at Yallourn. It was a mammoth task to construct the plant back in the days before modern earth moving machinery.

The next step was to construct a Temporary Power Plant (TPP) which could be used to supply power to Yallourn construction site, the open cut, the camps and the village of Morwell. On 25th of April 1921 the first turbo generator and the boiler of Temporary Power Plant came in to service and after three years of operation it was decommissioned in 1924. By the time it was retired, it has achieved its maximum demand of 950 kW.

The first sod was turned at Yallourn project site on 5th Feb on 1921. Horse drawn scoops worked on clearing and excavating the site and the construction began with help of a lot of man power.

The building was a steel framed brick structure, the steel work of which was supplied and erected by Redpath Brown and Co Ltd, Glasgow, Scotland. It was a building nearly 100m long, with various annexes which was large enough to have 12 boilers, also imported from UK. These boilers provided super-heated steam to the turbo generators.

Water for the boilers and the cooling system came from the Latrobe River, but unfortunately the flow was unreliable. This was overcome by constructing a weir, which created a pond and a stable water level.

A block of 1 square mile of land was set aside for the open cut mine. It was estimated to contain 150 million tons of coal, which was enough to power a 150 MW station for 100 years by 1920s estimates.

At the same time as the Power Station was being constructed, huge advances were being made in other areas such as advanced coal winning techniques. Stripping overburden from the coal was performed by 'Bucyrus' steam shovels. The preliminary work, consisting of digging an inclined cut down to the level of coal was partly performed by hand labour and horse drawn scoops. Refer ***Appendix 2*** *[FIG 4]* for a picture of a 'Bucyrus' steam shovel used in Yallourn open cut.

Later on, steam powered shovels were replaced by electrically powered shovels. However, these single scoop shovel designs were in turn replaced by the more efficient continuous chain bucket then continuous bucket wheel dredgers.

A huge workforce was required and the SECV had to provide shelter and support for the men. Therefore the Yallourn Township was started, a master plan insured a model town and even in the early days, the town, power station and the workforce were very close.

Despite the earlier set back of higher water content of the coal and tough physical environment, massive engineering and physical achievements had been made by 1924. Finally, Yallourn 'A' power station turbine house was completed in mid-1924. Refer ***Appendix 2*** *[FIG 5].* The first power flowed to Melbourne down the 132 kV transmission line on 24th June 1924. It had only taken less than 4 years to complete the construction and even by today's standards, it was a very short period of time. ***Appendix 2*** *[FIG 8].*

With the establishment of the Yallourn power station, Victoria has been able to break the coal supply shackles of New South Wales. However, in 1924 the government curtailed loan expenditure causing the dismissal of 500 State Electricity Commission of Victoria employees and retarding the completion of Yallourn power station, the exposure of the coal in Yallourn open cut and the building of Yallourn Township.

In 1927, parliamentary approval was given for Yallourn 'B' power station and the work started in 1929. ***Appendix 2*** *[FIG 11].* However, the start of the 1930s was not a good one for the SECV as major boiler problems were discovered. There was a major concern because, the same company which supplied the boilers for 'A' station was the successful tenderer for the supply of boilers for 'B' station. Therefore they had to redesign the boilers and it delayed the construction of the 'B' station.

The Death of Sir John Monash on 8th October 1931 was a great shock for the SECV and moreover the flooding on 1st December 1934 was also a huge disaster for the SECV. The rise of the Latrobe River, and its consequent flooding, caused much damage to large areas of Gippsland. There was major destruction as well as water damage at Yallourn works area.

Yallourn suffered not only from floods, but also from destructive bushfires. Bushfires threatened the works area and town of Yallourn on 8th January 1939, with the rest of Victoria experiencing the disasters of the 'Black Friday' fires on 13th January 1939. Moreover, another fire affected the open cut in February 1944 causing vast destruction to most of the machinery and it left many people homeless. Coal levels were flooded with water to put out the fire in the open cut. Consequently, SEC had to restrict the coal supply until May, while bushfire damage to open cut plant was repaired.

With the rising demand for electricity, another extension of 100 MW was added in 1954 called Yallourn 'C'. Three years later another 100 MW extension was erected, which consisted of two 50 MW turbo generators and 6 boilers (Yallourn 'D'). Years passed by normally at Yallourn, with only minor problems on generators and boilers. However, the electricity demand in Victoria was growing rapidly and SECV realised they needed another major extension with a higher efficiency. An approval given

for the 'E' extension of 240 MW and work started immediately in late 1957. By November 1961 the construction of the 'E' station has been finished and commissioned.

The 1970's could appropriately have been called the decade of development at Yallourn power station, but the development information derived was principally for future power stations. These same years marked the beginning of a trend to fairly rapid decline in the production importance of Yallourn power station's electricity contribution to the total supply to Victoria. The rapid increase in electricity demand led to the building of Hazelwood Power Station in the 1960's and the Yallourn W Power Station in the 1970's.

The energy fraction contributed by Yallourn power station to the Victorian system dropped from about 50% in the early 1960's to about 30% in the late 1960's. When 'A' station was retired in 1968 and 'B' station went in to cold reserve a year later, it took only two years for the YPS contribution to drop to 18% in 1971.

A, B, C, D and E stations closed in 1968,1969,1984,1985 and 1989 respectively. 'A' station ran for 44 years, 'B' station ran for 38 years, C, D and E ran for 30, 28 and 29 years respectively. By the end of the 1980's the Yallourn Power Station era was over.

Demolition of Yallourn Power Station

By 1989 A & B boiler houses have been demolished and the Yallourn E had been decommissioned. With no further use of the plant, the decision was made to demolish it to the ground level and to rehabilitate the area.

In 1992, the decision was made to privatise the Victorian electricity industry. The SECV would be no more. It was first disaggregated in 1993, and then the component parts were sold. From a thriving organisation of over 20,000 people by 1997 the SECV had reduced to a small group under Graham Brooke, who as statutory administrator in early 1994, replaced the former commissioners and the chief general manager. He had the responsibility of winding up the many residual interests and the commitments of the SECV.

It is perhaps fitting that one of the SECV's final projects was to supervise the demolition of the Yallourn Power Station facility. Hazards at the site were of concern and if not addressed the condition of the site would deteriorate further. After consideration of the alternatives, it was determined that the Yallourn Power Station should be totally demolished.

Before any major demolition began, the Heritage Victoria Advisory Committee required that the power station's past be documented. Some items of the plant were removed from the station. These items are on public display at PowerWorks tourist's visitor centre at Morwell. Also on display at PowerWorks is a bronze bust of Sir John Monash. A turbine set and the steam whistle from the old Yallourn Power Station are on display at the Museum at Yallourn North.

Fig.2 Bronze bust of Sir John Monash at PowerWorks

The station was constructed mainly of structural steel, reinforced concrete and bricks with much of the pipe work, flanges and heat lining areas were clad with insulation materials containing asbestos. At the time of the construction, such insulation was the state of the art throughout the world. Much of the complexity associated with the demolition related to the safe removal of the various hazardous materials. The SECV had a strong record in the management of the hazardous materials, particularly asbestos thermal insulation materials and required the demolition to be handled expertly.

Demolition started in 1995. However after 27 months, the appointed contractor was relieved of the project and it was resubmitted for tender.

In January 1998, a new contractor was awarded the project and the work commenced in the following month. The first task was to locate and identify the materials containing asbestos and other hazardous products. Those areas were sealed and the work commenced on the removal.

The work was difficult and very time consuming and could only be carried out by licensed contractors. The materials containing asbestos were removed, bagged and finally buried in the EPA licensed asbestos dump.

The site clearing was completed in 1999 by Guilfoyle Australasia Pty Ltd.

3.1.18 Heritage Listings

1. **National Trust Database**

   Title: Yallourn Power Station ‘A-E’

   File Number: B5758

   Date: N/A

   http://vhd.heritage.vic.gov.au/search/nattrust_result_detail/68756

2. **Victorian Heritage Database**

Title: Former Yallourn Power Station Administrative Building

Victorian Heritage Register Number (VHR): H1054

Date: N/A

http://vhd.heritage.vic.gov.au/vhd/heritagevic#detail_places;11491

3.1.19 Physical Condition

Demolished.

3.2 Assessment of Significance

The first stage of Yallourn Power Station – Yallourn 'A' - was opened in 1924 as the first of the Victorian State Electricity Commissions' brown coal-fired power stations. Located alongside and operating in conjunction with an extensive open-cut brown coal deposit, the station quickly established brown coal as a viable fuel source and expansion followed. 'B' Station was completed in 1938. 'C' Station in 1956 'D' Station in 1958 and 'E' Station in 1962. From its inception in 1924 until the 1950s, the Yallourn power station was the base-load power station for the Victorian electricity grid.

Yallourn Power Station has historic, technological and social significance and therefore is an important Engineering Heritage work, albeit that the most physical elements have since been demolished.

3.2.1 Historical Significance:

Yallourn Power station is significant in the evolving pattern of the history of power generation in Victoria.

It was the first brown coal power station in Australia and throughout its 65 years of operation, it was a central element in the state electricity network and pioneered the technological development of large scale brown coal use for energy production in Victoria.

It was the first power station to be built for state wide power distribution. For more than 60 years it was the major supplier of the electricity that was part of the day to day lives of Victorian people and the mainstay of Victorian industry.

It was the second major industrial plant to be built in the Latrobe Valley after Maryvale Paper Mill and hence was the corner-stone for the industrial and social development of the region.

3.2.2 Historic Individuals or Association:

Sir John Monash (1865–1931)

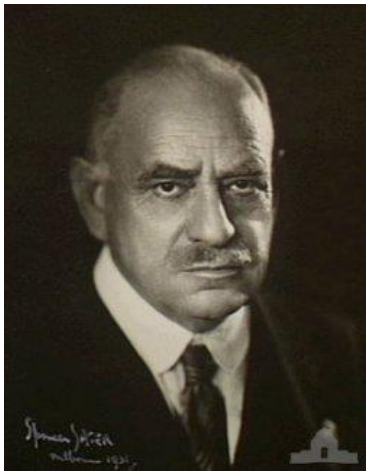


Fig.3 Sir John Monash

"John Monash was born in Melbourne on 27 June 1865 into a Prussian-Jewish family. He was educated at Scotch College and Melbourne University. By 1895 he had degrees in arts, engineering and law and had qualified as a municipal surveyor, an engineer of water supply and a patent attorney. As an engineer Monash's early career was in bridge construction working for a time with the Melbourne Harbour Trust, before becoming a partner in a bridge building firm. By the turn of the century his focus had changed to building construction.

Monash's military career began in 1884 with his membership of the Melbourne University company of the 4th Battalion, Victoria Militia, and then moving to the North Melbourne Battery of the Metropolitan Brigade of the Militia Garrison Artillery. He was commissioned in 1887. By 1913 Monash had the rank of Colonel and was appointed to command the 13th Infantry Brigade. With the outbreak of World War I in 1914, Monash was transferred from the militia to active service. In 1915 he served as Chief Censor until taking command of the 4th Infantry Brigade (AIF). In this command he served at Gallipoli.

Promoted to Major-General, he commanded the 3rd Division, AIF in France in 1916. Monash succeeded General Birdwood as Australian Corps commander in 1918 and, in the same year, was knighted by King George V in recognition of his role in the Battle of Hamel Hill. With the conclusion of the war, Monash became Director-General of Repatriation and Demobilisation with responsibility for arranging the return of Australian troops from Europe.

Back in Australia Monash resumed his engineering career firstly as General Manager and later as Chairman of the State Electricity Commission (SEC) of Victoria. Under his leadership the SEC became an important body in developing Victoria's brown coal reserves as an electricity source and, by 1930, extending the power grid across the whole of the State.

John Monash died in Melbourne on 8 October 1931."

(National Archives of Australia, *http://www.naa.gov.au/aboutus/publications/factsheets/fs121.aspx, 1997)*

Jack Abell

"One of the original Yallourn pioneers and long-time resident of the town, Jack was a turbine driver in the Temporary Power Plant who was transferred to Yallourn 'A' turbine room to start up the new plant. He was a very capable man in his job, but he had some interesting sides to his personality, like so many of his contemporaries.

Jack had a mischievous sense of humour and on one occasion while in the Temporary Power Plant this manifested in a way which was risky to his employment. H R Harper, the SEC's first Chief Engineer, was a regular visitor to the TPP and often wore an immaculately white Panama hat to complement his linen jacket. Jack positioned himself on a boiler gallery well above the operating floor, waited until the inspecting group was in position, and carefully dropped a piece of black greasy cotton waste aimed at HRH's Panama hat.

Jack was also known to be a great gardener and had a very productive vegetable garden, like many others of that era. Unlike the others though, Jack recovered some of his pay which went towards house-keeping expense, by insisting that his wife pay market prices to him for vegetables she used from the garden (and served up to him at meal times). He was a real character."

(**Yallourn Power Station, A history 1919 to 1989,** *C Harvey, p342***)**

3.2.3 Creative or Technical Achievement:

The Yallourn Power Station was the first station in Victoria to be constructed for state wide public supply and has historic and social significance as it represents the first use of brown coal for power generation in Australia and the first step in Victoria's independence from NSW coal supply.

It is a remarkable example of the changing technology of electricity generation over a period of seven decades. Demonstrating, in particular, the dramatic increase in size, operating pressure and power output of boilers and turbo-alternators over this period, and the transition from a typical "range type" power station of the 1920s, to the more modern "unit type" power station design introduced during the 1950s.

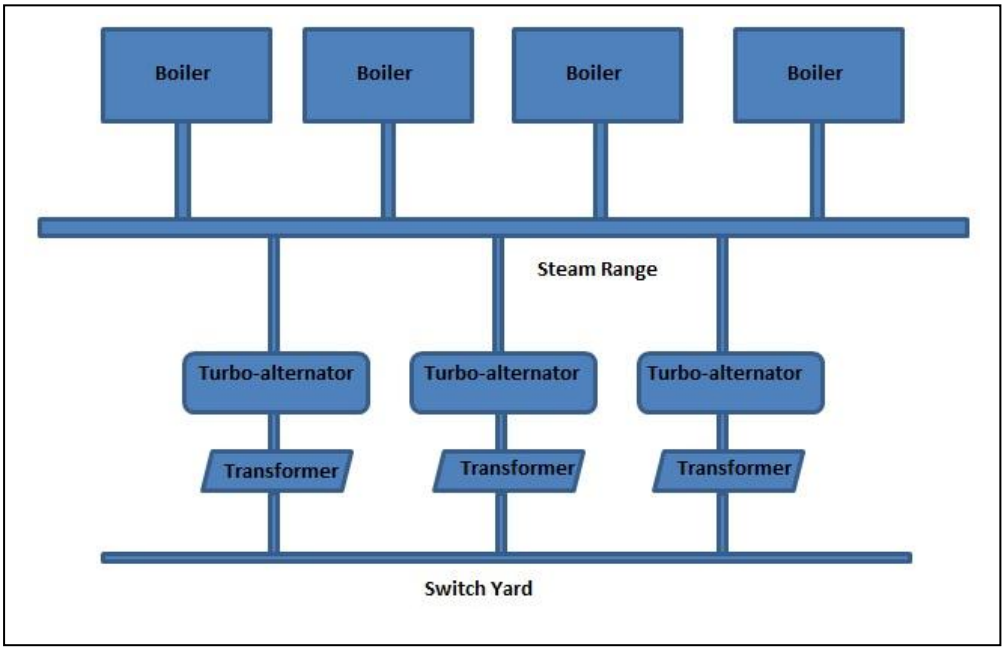


Fig.4 Range type plant

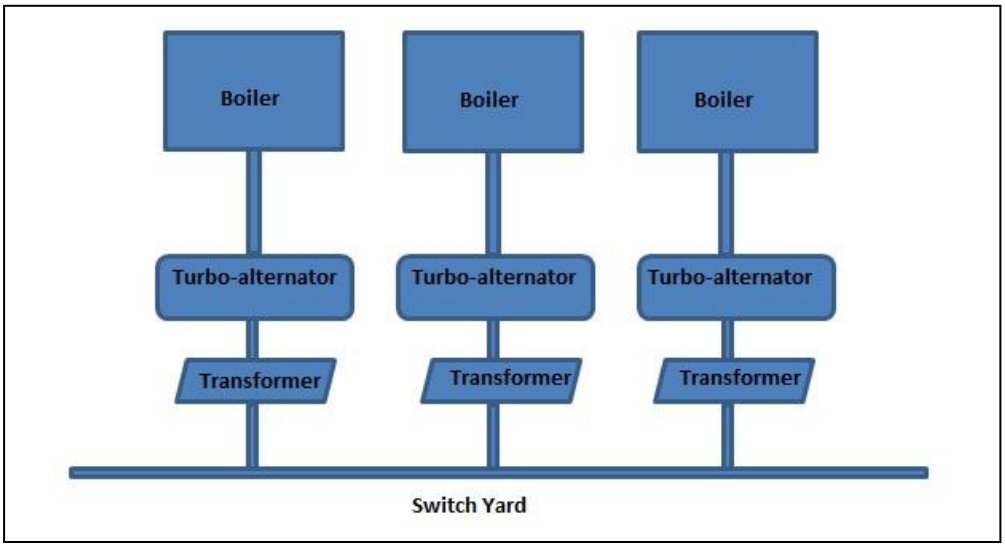


Fig.5 Unit type plant

In a Range type plant, all the boilers are connected to a large pipe. The turbines are also connected to the same pipe. This configuration added additional complexity and maintenance difficulties to the system due to the complex interconnections and isolations between components.

Unit type plant is simpler, with a boiler for each turbine. All the auxiliaries including pulverising mills also are unitised. If any component fails, it does not affect the unit alongside. Maintenance work is also simplified in the unit configuration. At Yallourn Power Station, engineers first introduced the more reliable unit type configuration in 1960s. Yallourn 'E' power station was a unit type plant.

Yallourn Power Station is also significant as the site of an extensive series of experimental trials, plant modifications and adaptations were conducted resulting in the successful development of new techniques for efficiently burning the extremely wet Latrobe Valley brown coal.

Example:

The boiler system used in A & B stations wasted a lot of fuel. Travelling grate stokers used in earlier stages of the Yallourn Power Station and this was very inefficient. Travelling grate stoker is a type of furnace stoker; coal feeds by gravity into a hopper located on top of one end of a moving (travelling) grate; as the grate passes under the hopper, it carries a bed of fresh coal toward the furnace.

Yallourn 'C' was the first power station in the country to burn pulverised coal. This fuel has special characteristics and engineers had a lot of problems to overcome such as stability, reliability and burner designs.

By pulverising the fuel before feeding it in to the boiler allows more of the coal surface to expose to oxygen and the fuel in smaller particles burns brilliantly. Power station engineers developed a method of separating hot gasses from the burning coal and these gasses were then reused to pre-dry the pulverised coal making it easier to burn, cleanly and more efficiently.

3.2.4 Research Potential:

Yallourn Power Station has been well documented. Significant research has been carried out by Colin Harvey in preparation for the writing of his book "*Yallourn Power Station, A History 1919 to 1989"* published in 1993.

However, it may be worth researching the early development and the experimentation of the burning of pulverised brown coal. Also it is worth researching the problems they experienced and the steps they went through.

There is potential for researching photographs of the power station and its components. Producing a photographic record for the Yallourn Power Station is very important since it has already been demolished.

3.2.5 Social:

The station has fulfilled an important socio-economic role as a major supplier of electricity to Victoria for half a century. The Yallourn Power Station was part of the day-to-day lives of Victorian people and a mainstay of Victorian industry. Particularly after the Second World War the abundant and reliable supply of electricity stimulated the development of manufacturing industries. It also improved domestic life through the introduction of labour saving electric appliances, and generally enhanced health, occupational safety and leisure.

Moreover, it has served the state as a major industrial plant in the Latrobe Valley, and the region's largest single employer until the 1950s.

Furthermore, Yallourn Power Station caused direct and indirect impact that on the development of several Latrobe Valley towns over a period of five decades by stimulating new secondary industries, housing, transport facilities and even municipal facilities, in particular for the township of Yallourn.

Yallourn Township

Yallourn was a company town built between the 1920s and the 1950s to house employees of the State Electrical Commission of Victoria, who operated the nearby Yallourn Power Station complex. However, expansion of the adjacent open cut brown coal mine led to the closure and removal of the town in the 1980s.

The town was planned by A.R. La Gerche, the State Electricity Commissions Architect. The design of Yallourn incorporated lessons learnt from the early UK garden cities of Welwyn Garden City and Letchworth Garden City inspired by Ebenezer Howard. Walter Burley Griffin also drew on similar sources for his designs.

At its peak, the town's population reached 5000. Many of the people who were relocated from Yallourn built homes in Moe, Morwell, Newborough, Traralgon, Yallourn North and other surrounding towns in the Latrobe Valley.

3.2.6 Rarity:

Components of the Yallourn Power Station were mostly standard equipment for power generation in their respective eras and were therefore not rare.

Fig.6 Power station whistle

(http://gippslandheritagepark.blogspot.com/2009/11/emden-steam-whistle.html)

There is one very rare element that still exists, which is the power station steam whistle. The whistle was the steam whistle from the World War I German raider *SMS Emden*, which was defeated in battle by *HMAS Sydney* in the Indian Ocean and was beached on the Cocos Islands.

This is widely seen as the first significant Australian naval victory in World War 1. In 1915, the whistle was salvaged from the *Emden's* wreck, and was obtained by Sir John Monash. The whistle was then fitted to the Yallourn Power Station where it was used as a signal for starting and finishing work, lunch breaks, crib breaks and as a warning device. See ***Appendix 2*** *[FIG 14].*

(**Yallourn Power Station, A history 1919 to 1989,** *C Harvey, p196-p198***)**

3.2.7 Representativeness:

Yallourn Power Station was representative of steam power stations built during the era in which it operated. Most of the coal power stations during that era looked very much the same. However, Yallourn was the first brown coal power station in Australia.

The boilers used in Yallourn Power Station were relatively large when compared with other coal-fired power stations since the Yallourn was using wet brown coal in its boilers.

3.2.8 Integrity/Intactness:

The Yallourn Power Station was demolished in 1995.

3.2.9 Statement of Significance:

The Yallourn Power Station was opened in 1924 as the first of the Victorian State Electricity Commissions' brown coal-fired power stations. Located alongside and operating in conjunction with an extensive open-cut brown coal deposit, the station quickly established brown coal as a viable fuel source and expansion followed. 'B' Station was completed in 1938. 'C' Station in 1956 'D' Station in 1958 and 'E' Station in 1962. From its inception in 1924 until the 1950s, the Yallourn Power Station was the base-load power station for the Victorian electricity grid.

Throughout its sixty-five years of operation, it was a central element in the state electricity network and pioneered the technological development of large scale brown coal use for energy production in Victoria.

Yallourn Power Station has historic, scientific, technological and social significance.

The Yallourn Power Station is significant in the evolving pattern of the history of power generation in Australia and therefore is an important item of heritage for the State of Victoria.

The Yallourn Power Station was the first station in Victoria to be constructed for statewide public supply and has historic and social value as it represents the first use of brown coal for power generation in Australia and the first step in Victoria's independence from NSW coal supply.

The station has additional symbolic value as the first major industrial plant in the Latrobe Valley. It was therefore a major milestone in the industrial development of Victoria.

(**Victorian Heritage Database**, *http://www.heritage.gov.au/cgi-bin/ahpi/record.pl?VICH1054*)

3.2.10 Area of Significance

National significance

4 Interpretation Plan

Public access to the former power station site is restricted and the current owner, TruEnergy, has declined to have a publicly accessible engineering heritage marker and interpretive panel on or immediately beside the former YPS site. An investigation of the public land and roads in the surrounding area failed to find a practical and safe alternative location with a view of the former site. Instead, it is planned to place the engineering heritage recognition heritage marker alongside the existing Yallourn Power Station interpretation at PowerWorks premises in nearby Morwell. PowerWorks is the publicly accessible interpretation and visitors centre for the Latrobe Valley electricity generation companies. **As this centre already has extensive and adequate information displays relating to the former Yallourn power station, an additional interpretation panel is not considered to be warranted or appropriate.**

The following images show typical parts of the interpretation at PowerWorks relating to Yallourn Power Station:

The above images shows a general view of the interpretation area with interpretation on the right and other displays on the left.

Image of interpretation showing Yallourn Power Station and the mining of brown coal in the Latrobe Valley.

Image of early interpretation covering construction work at Yallourn Power Station in the early 1920s.

Image of interpretation of early work at Yallourn Power Station and contemporary uses of electricity in Melbourne.

Image of exhibits of equipment and electrical instruments (at rear) used at Yallourn Power Station. The EHA marker is likely to be mounted on one of the yellow columns in the centre of this image.

Display case containing portable electric meters used at Yallourn Power Station. The EHA marker is likely to be mounted on one of the columns in this vicinity.

Steam turbine rotor from Yallourn B Station mounted outside the room at PowerWorks where the Yallourn Power Station interpretation is located and where the EHA marker will be mounted. The bust of Sir John Monash from the Yallourn Town Square is behind the camera.

5 References

[1]. **Harvey, C,** ***Yallourn Power Station A History 1919 to 1989*****,** State Electricity Commission of Victoria, 1993

[2]. **McGoldrick, P,** ***Yallourn Was..,*** Gippland Printers, 1984

[3]. *http://vhd.heritage.vic.gov.au/*

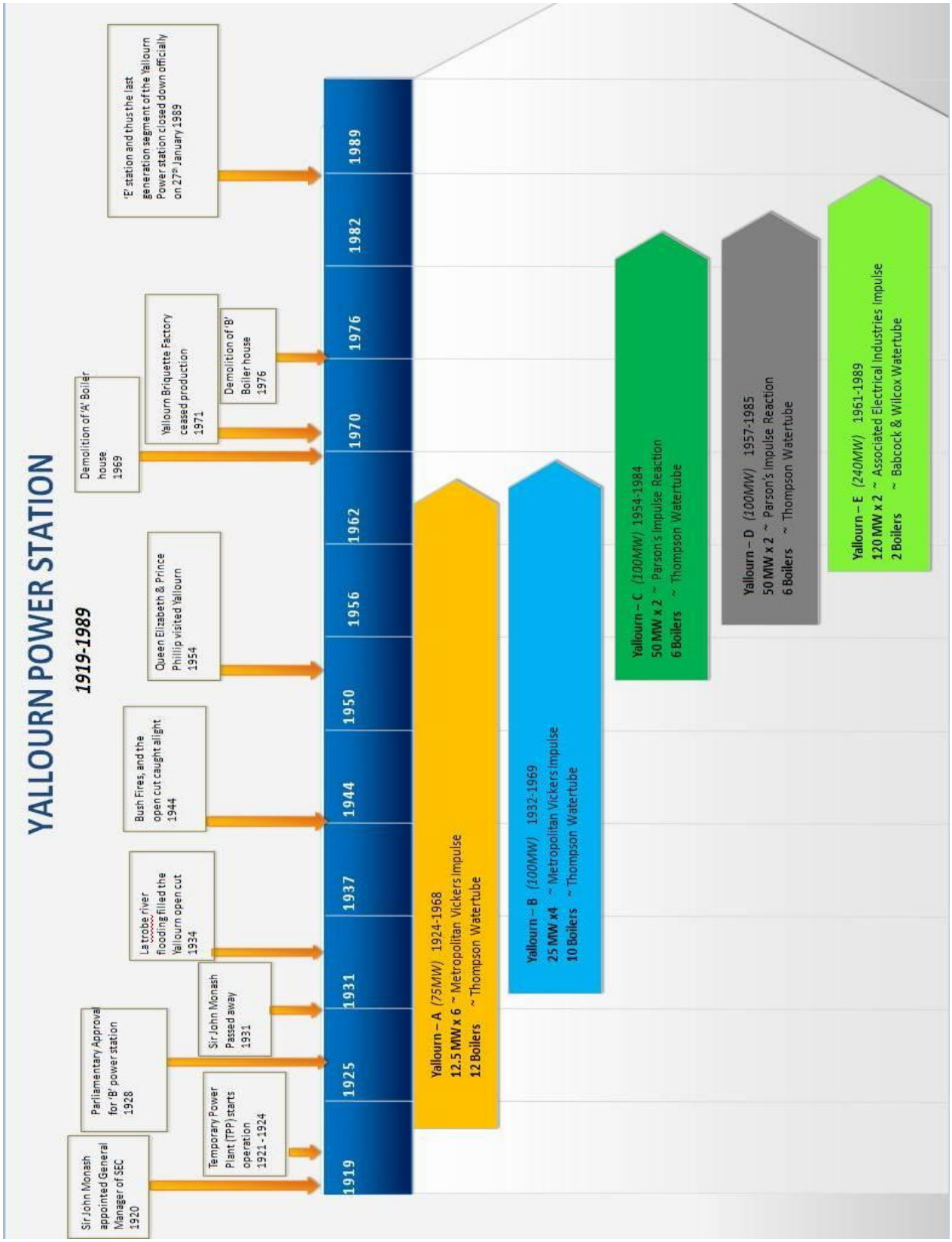
[4]. *http://en.wikipedia.org/wiki/Yallourn_Power_Station,_Victoria*

[5]. **Cecil Edwards,** ***Brown Power****, State Electricity commission of Victoria, 1969*

[6]. **SECV**, **Three Decades,** ***The story of the State Electricity Commission of Victoria from its inception to December 1948,*** *State Electricity commission of Victoria, 1949*

6 Appendices

Appendix 1: Latrobe Valley power stations Timeline



List of Power Stations in Latrobe Valley

POWER STATION	YEAR OF COMMISSIONING OF FIRST UNIT
Yallourn	1924
Morwell	1956
Hazelwood	1964
Yallourn W	1974
Loy Yang A	1982
Loy Yang B	1993

[TABLE] 1

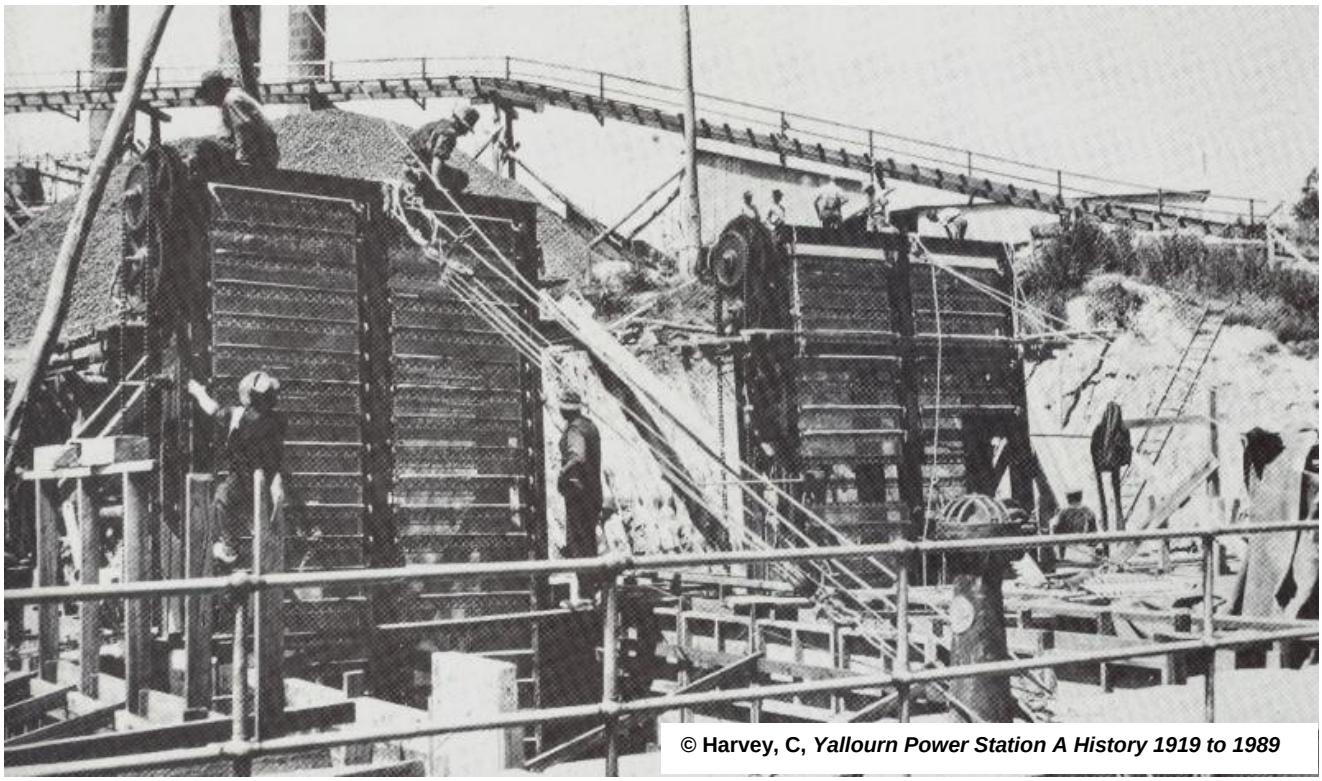
Appendix 2: Pictures with captions

[FIG .1] YALLOURN POWER STATION FROM HILL - PANORAMIC VIEW

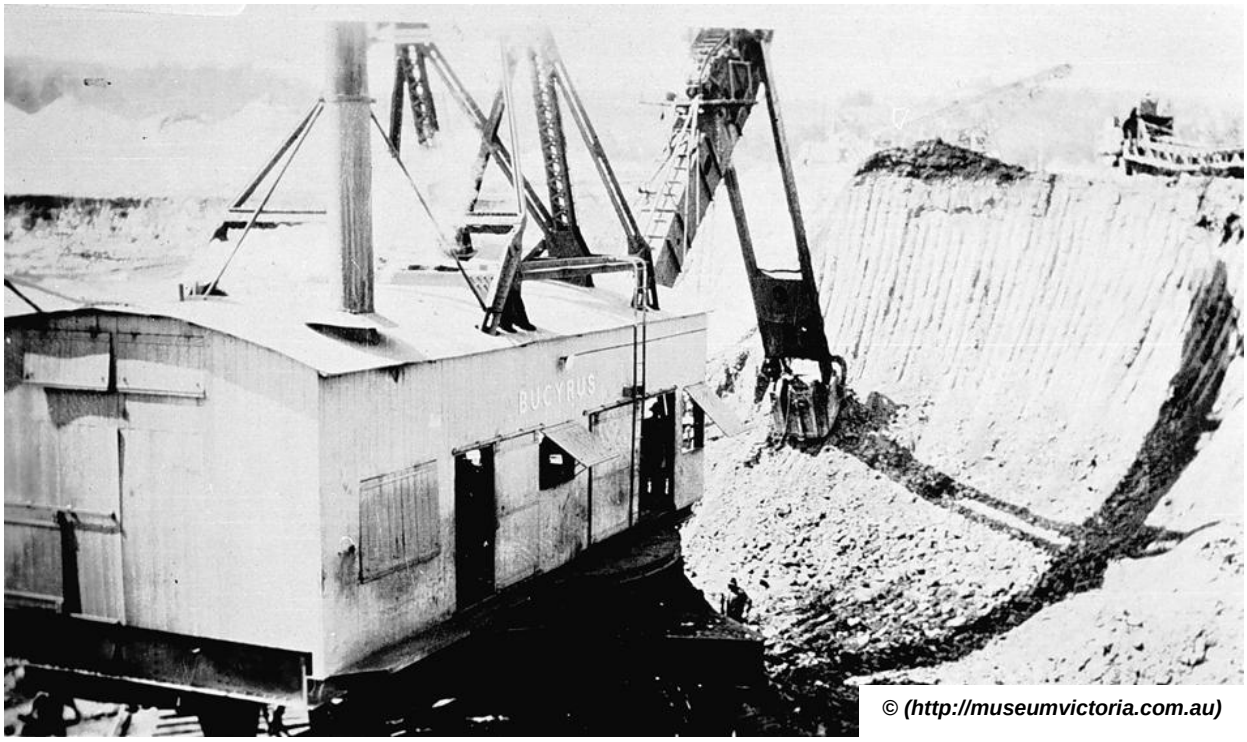
Note:

This photograph was taken before 1968 when "A" Station closed as smoke can be seen coming from all groups of stacks) and after 1961 as "E" Station is in operation (light coloured stacks with smoke at rear).

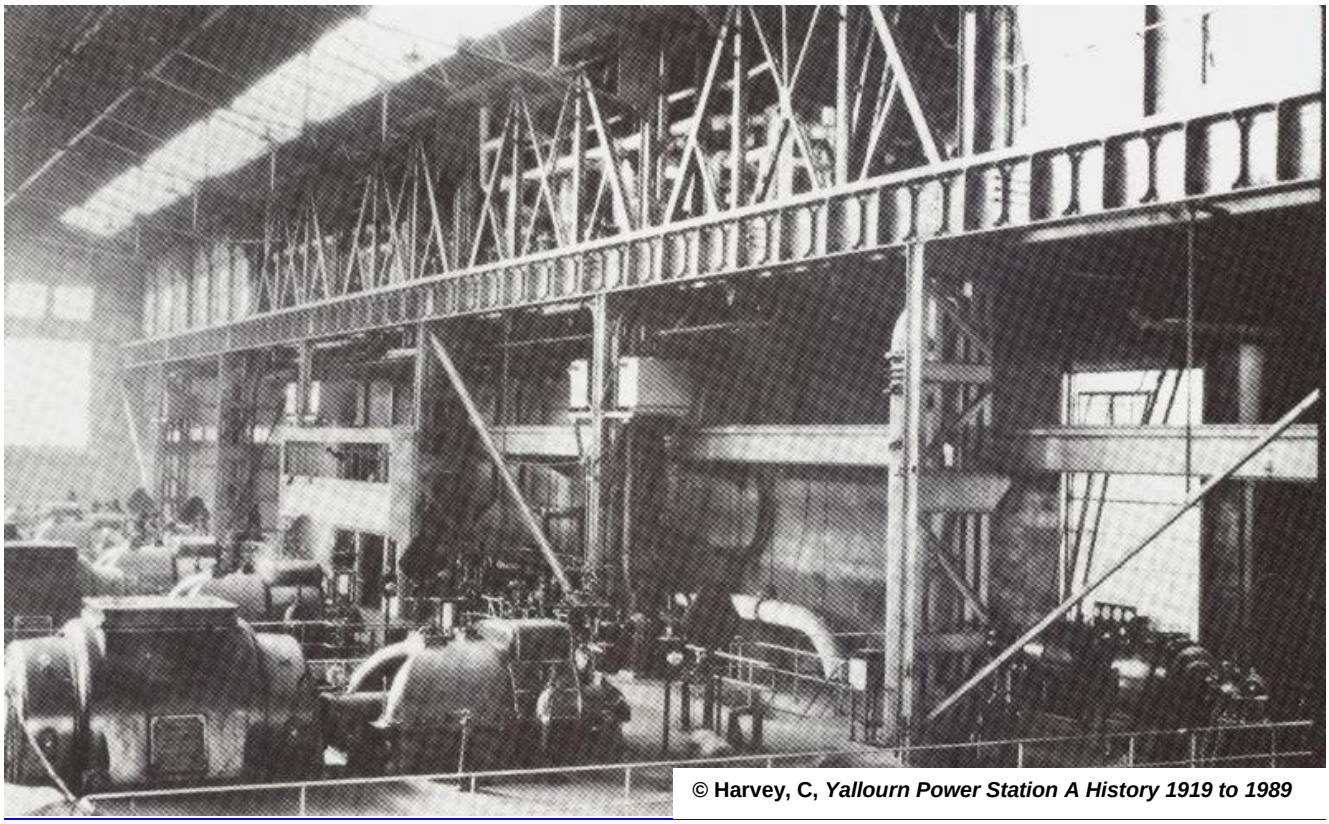
[FIG .2] YALLOURN POWER STATION WORKERS AT END OF SHIFT 1920s



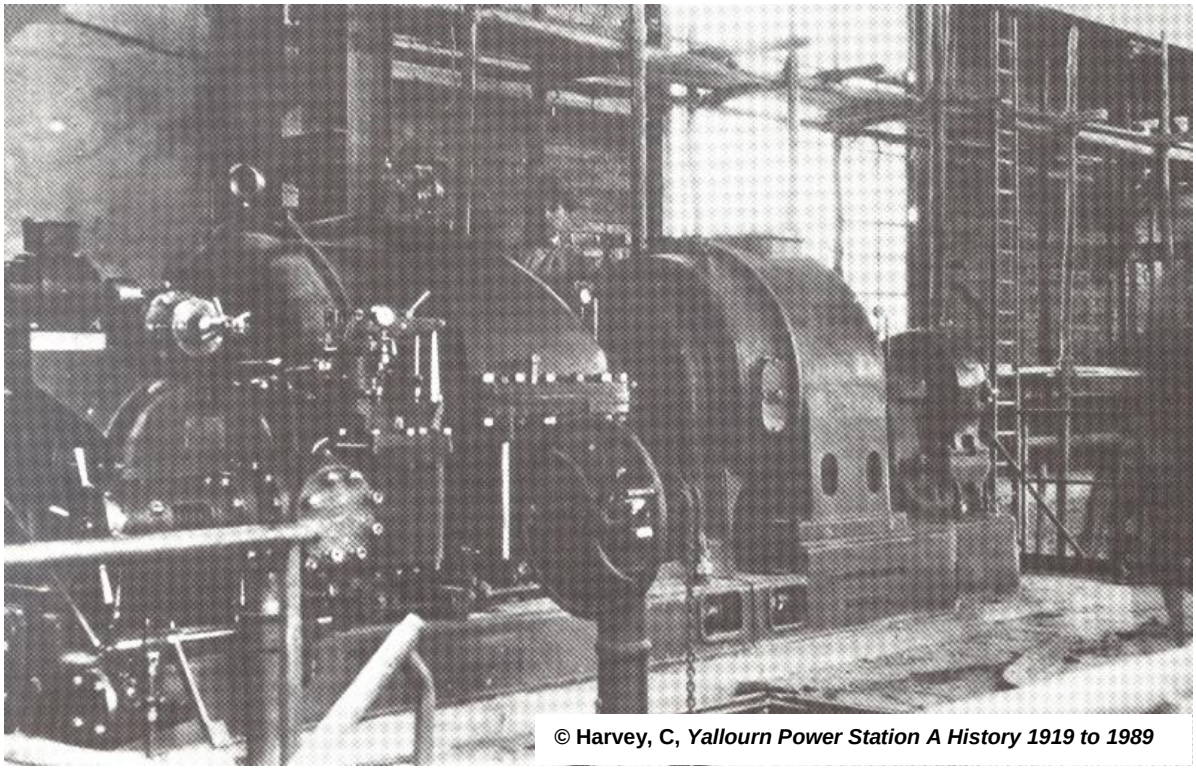
[FIG .3] CONSTRUCTION OF THE SCREENS FOR THE C.W SYSTEM 31 JANUARY, 1924.



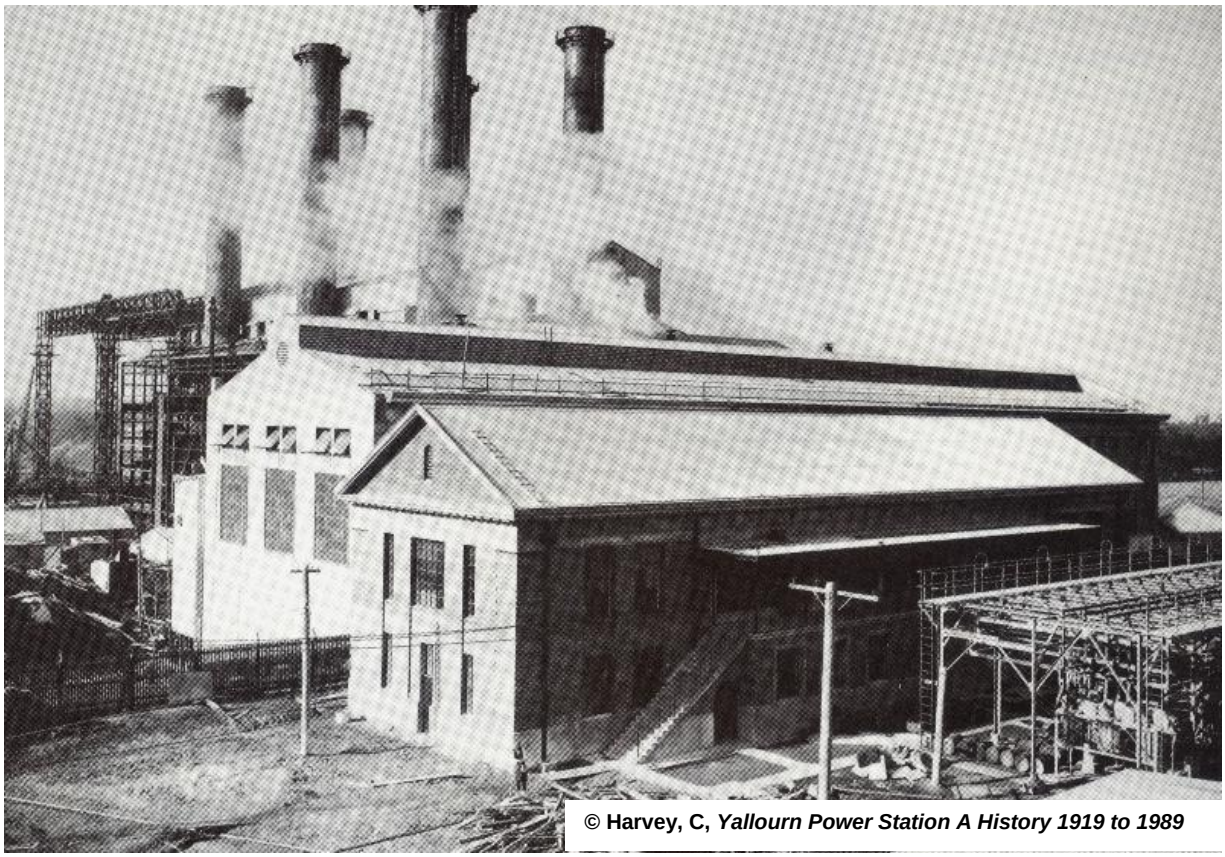
[FIG .4] THE BUCYRUS STEAM SHOVEL IN THE OPEN CUT COAL MINE



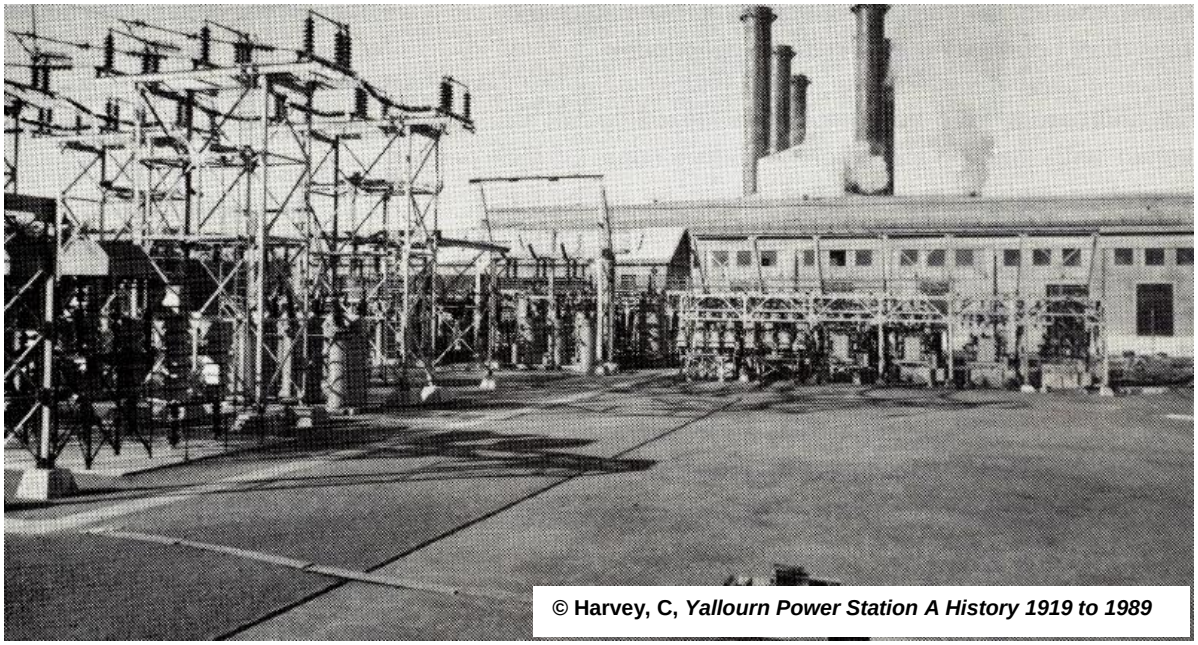
[FIG .5] 'A' STATION TURBINE ROOM WITH THE HOUSE SET ON RIGHT OF PHOTO



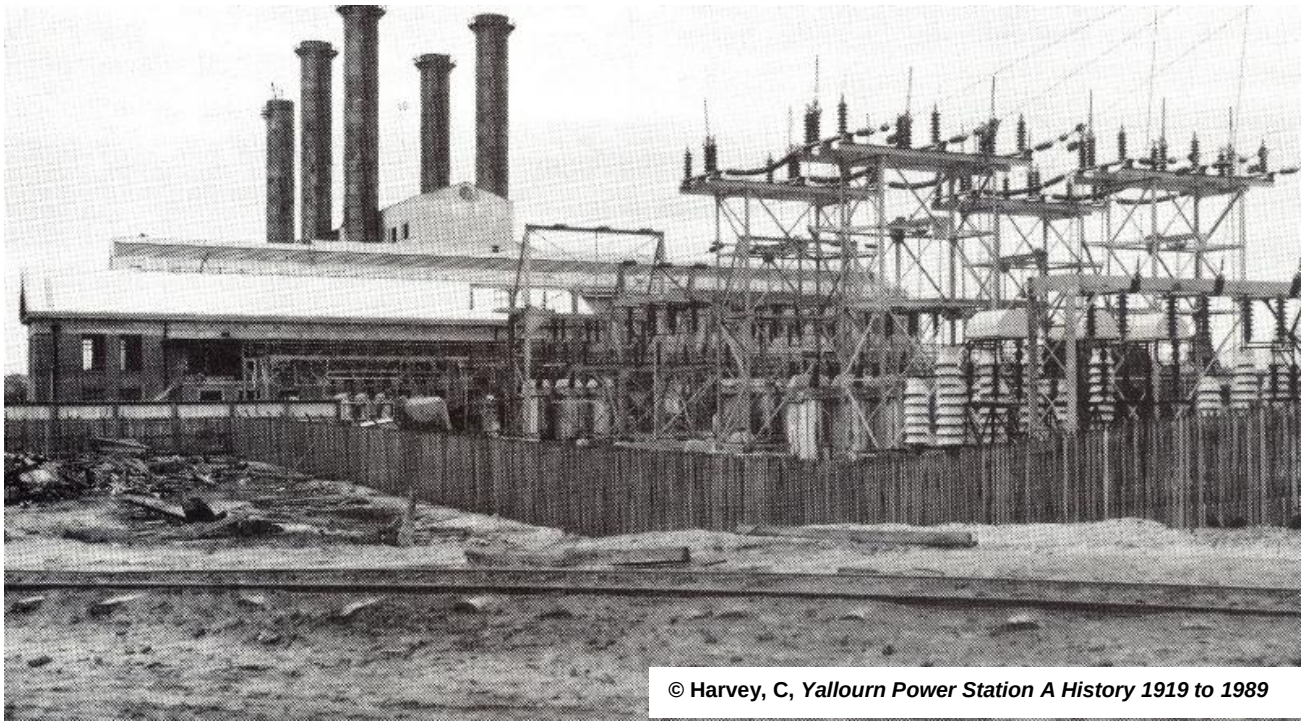
[FIG .6] THE 600KW HOUSE SET THAT CAME FROM TPP TO 'A' STATION



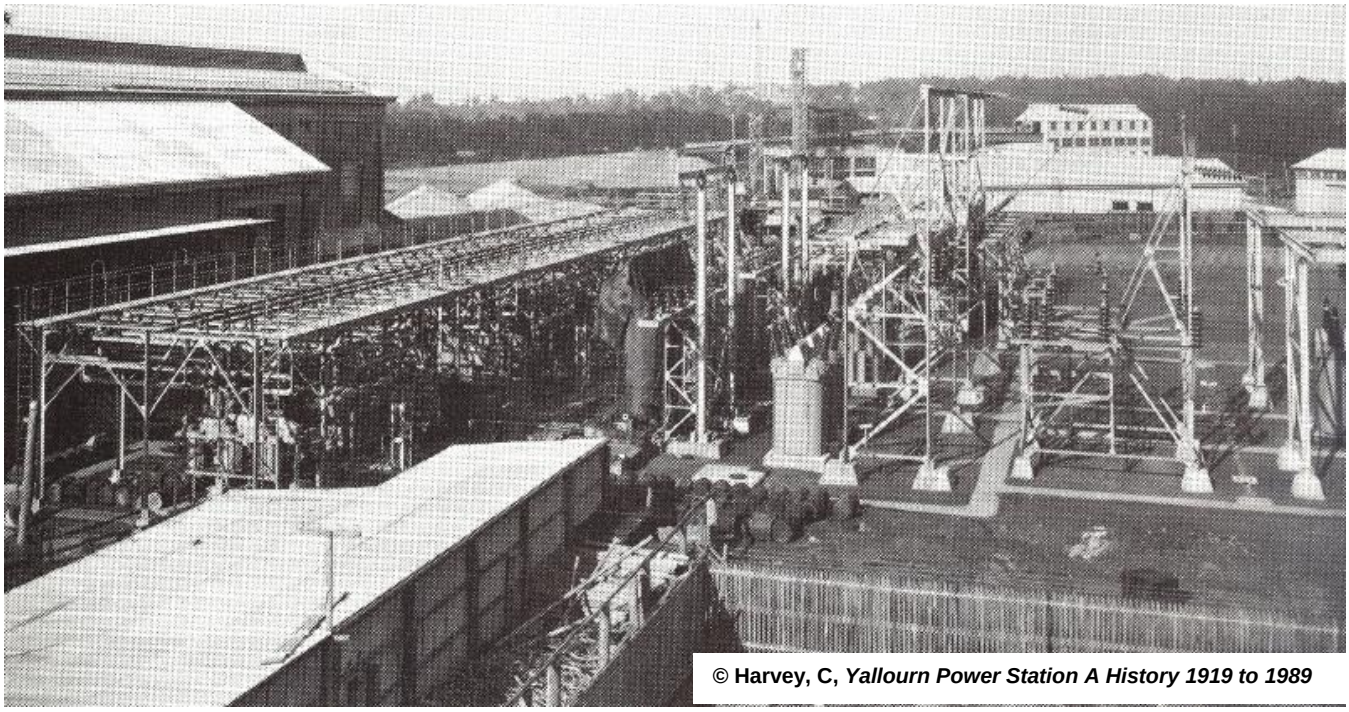
[FIG .7] 'A' POWER STATION AND CONTROL HOUSE 1925



[FIG .8] POWER STATION GENERATING ELECTRICITY 15 JUNE 1924, FIRST ELECTRICITY TO MELBOURNE

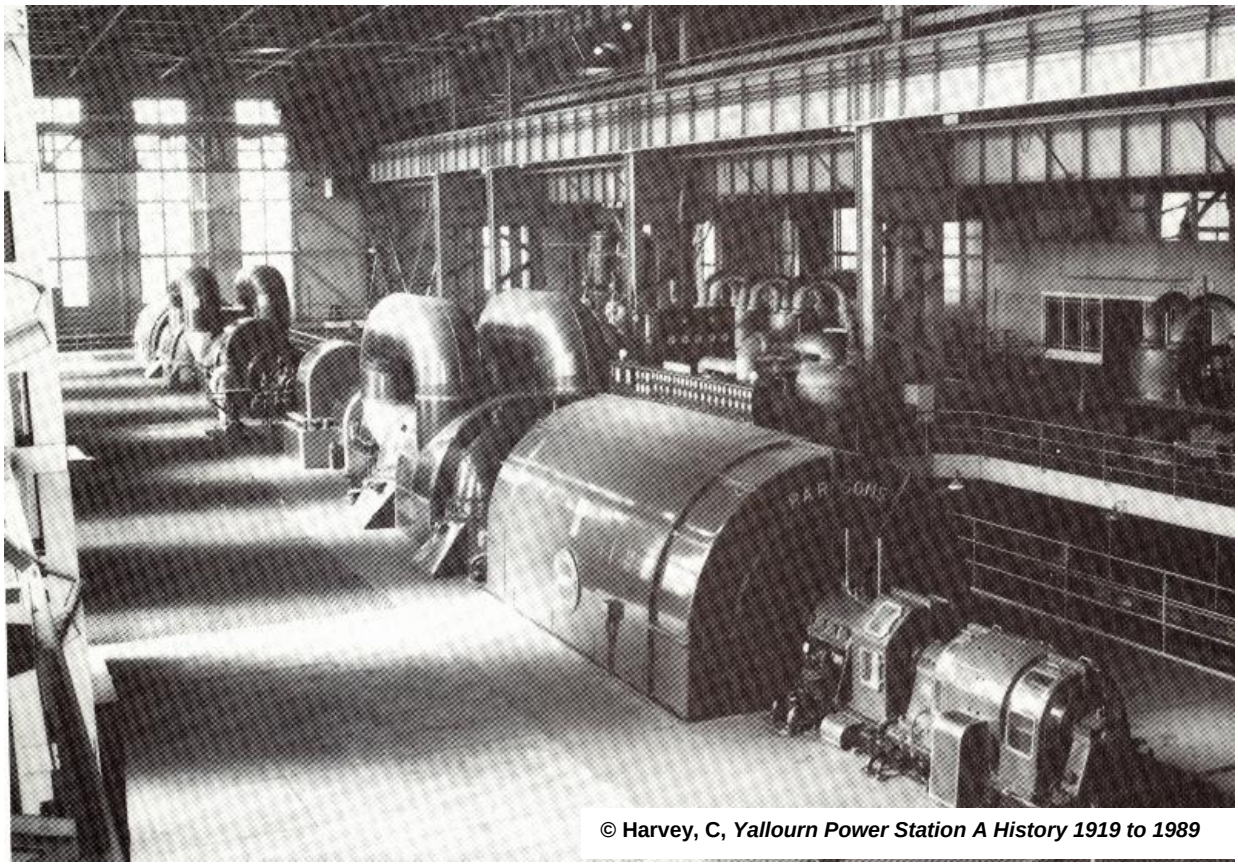


[FIG .9] 'A' POWER STATION AND HIGH TENSION TRANSMISSION LINE, 1925

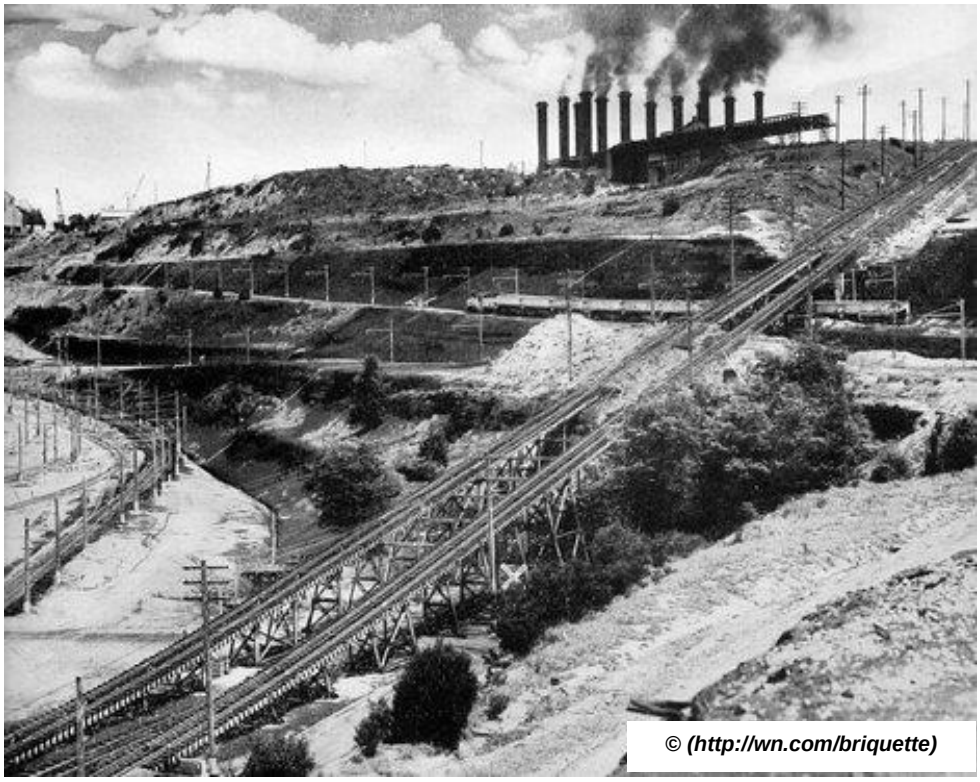


[FIG .10] TRANSMISSION AREA AND SCREEN HOUSE (LOOKING-SOUTH EAST)

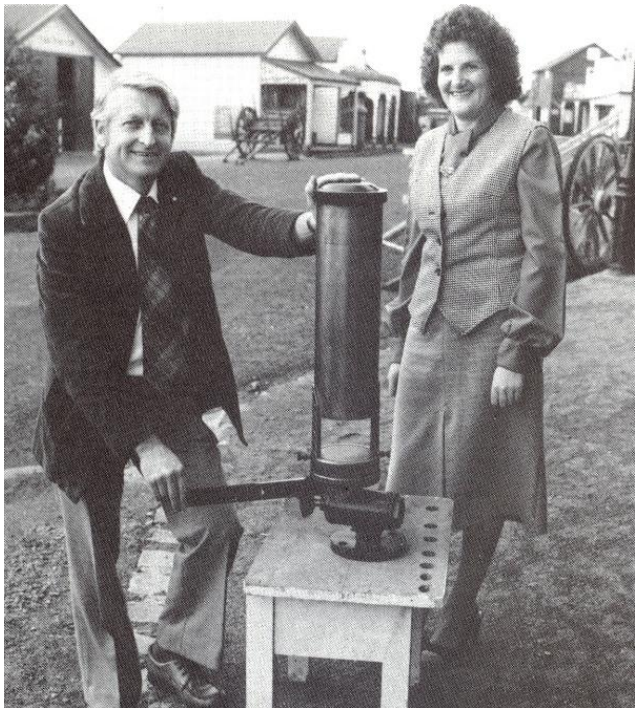
[FIG .11] YALLOURN 'B' POWER STATION CONSTRUCTION



[FIG .12] C2 AND C1 MACHINES LOOKING NORTH 18 OCTOBER, 1955



[FIG .13] INCLINE FROM THE OPEN CUT TO THE POWER STATION AND BRIQUETTE FACTORY

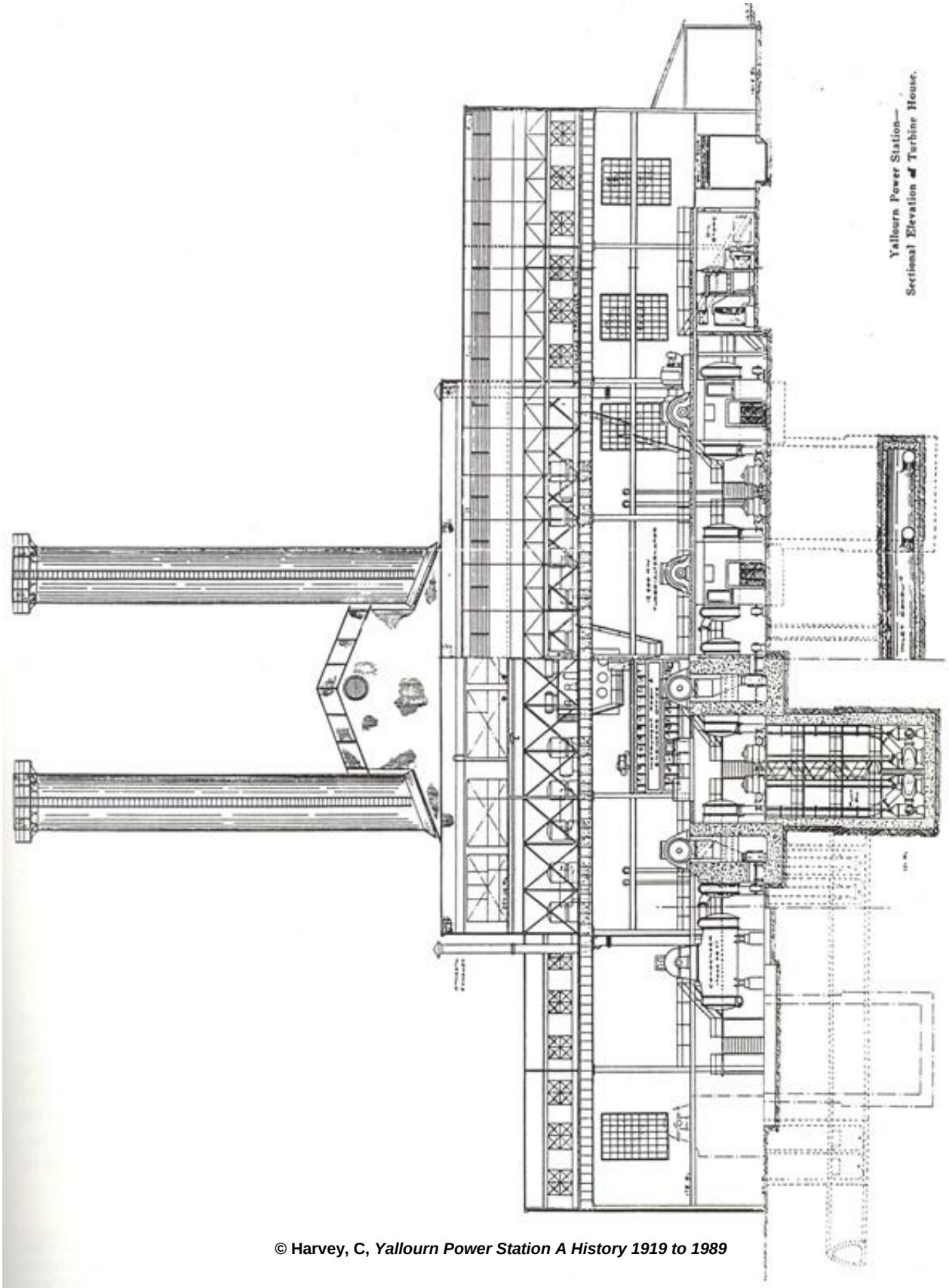


© Harvey, C, ***Yallourn Power Station A History 1919 to 1989***

[FIG .14] YALLOURN 'A' POWER STATION WHISTLE WITH DON FERGUSON AND SHEILA JOHNSON AT OLD GIPPSTOWN FOLK MUSEUM, 2 JUNE, 1980

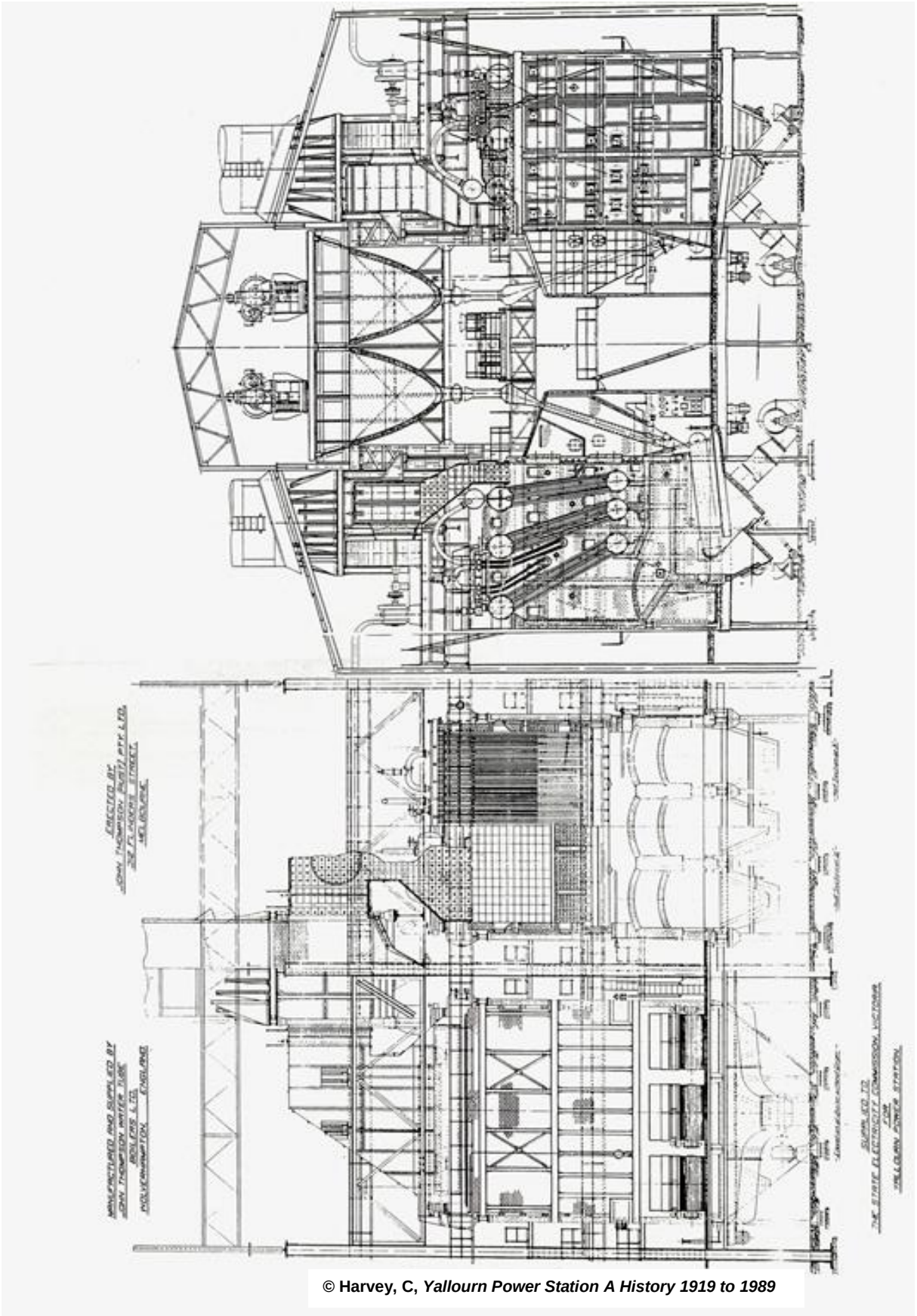
[FIG .15] YALLOURNN POWER STATION TURBINE OVERHAUL, 1947

[FIG .16] YALLOURN POWER STATION MAIN TRANSFORMERS



© Harvey, C, *Yallourn Power Station A History 1919 to 1989*

[FIG .17] YALLOURN 'A' SECTIONAL ELEVATION OF TURBINE HOUSE

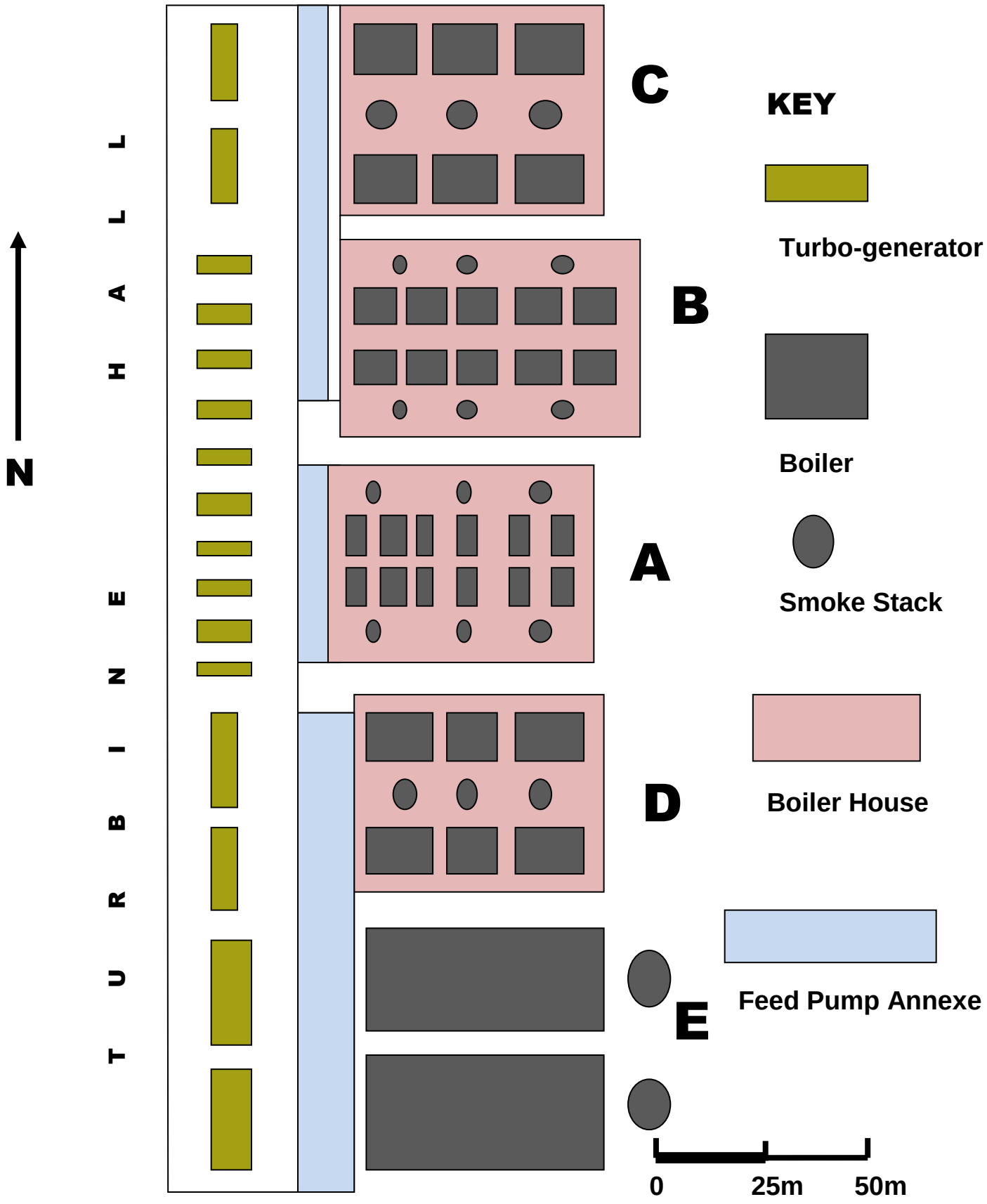


© Harvey, C, *Yallourn Power Station A History 1919 to 1989*

[FIG .18] YALLOURN 'A' SECTIONAL VIEWS OF THE BOILER HOUSE

PLAN OF YALLOURN POWER STATION

[FIG .19] YALLOURN POWER STATION PLAN



Appendix 3: Letter of Approval from PowerWorks

PowerWorks P/L
P.O. Box 3246
Morwell Business Centre
Vic, 3844

4/7/2011

Dear Owen,

Re. Heritage recognition for Yallourn Power Station

On behalf of PowerWorks, I am pleased to advise you of our acceptance of your proposal to place an Engineering Heritage Recognition Marker for Yallourn Power Station at the PowerWorks site.

We look forward to being involved in the unveiling ceremony and offer our assistance in the lead-up and on the day where possible.

If you have any queries please let me know.

Regards

Marcus Fraser
PowerWorks General Manager

P (03) 5135 3415
M 0418 572 440
W www.powerworks.com.au

VERSION 5	18 APRIL 2011	7043 WORDS	
VERSION 6	10 JUNE 2011	7079 WORDS	Minor editing MP and OP
VERSION 7	10 JUNE 2011	7079 WORDS	Minor reformatting after accepting version 6 Track Changes
VERSION 8	6 JULY 2011	7360 WORDS	Added Approval letter from PowerWorks, replaced plan of Yallourn Power Station (Gig 19) with ungraded version and added images of interpretastion at PowerWorks.
VERSION 9	11 JULY 2011	7461 WORDS	Modified clause 3.1.8 and page 4 to harmonize wording on ownership and added note relating to PowerWorks being the owner at the interpretation site.
VERSION 10	12 JULY 2011	7460 WORDS	Further modification to p4 by MP.
VERSION 11	14 JULY 2011	7460 WORDS	Added signed Nomination Letter.